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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

LIST OF PUBLICATIONS AND PATENTS

of the
Northern Utilization Research Branch
Peoria, Illinois

July - December 1955

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

INVESTIGATIONS ON THE BITTER AND BEANY COMPONENTS OF SOYBEANS.

H. M. Teeter, L. E. Gast, E. W. Bell, W. J. Schneider, and J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 32(7): 390-397. July 1955.

Substances that impart undesirable bitter and beany flavors and odors to soybean flour were investigated using an alcoholic extract of hexane-extracted soybean flakes. Compounds isolated include acetone, methyl *n*-propyl ketone, an unsaturated 11-carbon-atom ketone, phenols, carboxylic acids having 3, 5, 6, 7, 8, 9, and 10 carbon atoms, and esters of certain of these acids with an unidentified alcohol.

A PORTABLE RACK FOR STAINING JARS.

Ralph W. Kuehne and Lenora J. Rhodes.

Stain Technol. 30(4): 159-160. July 1955.

A simple and inexpensive rack has been designed for the transport and storage of stains and reagents in Coplin staining jars in bacteriological and histological laboratories. The rack promotes ease of carrying, prevents spillage, and keeps the jars permanently in the correct sequence. Details of construction are given. The design can be modified to hold as many jars as necessary and can also be modified to accommodate Stender or other type staining jars or reagent bottles.

NEW MATERIALS AND PROCEDURES FOR GENETIC STUDIES OF YEASTS

Lynferd J. Wickerham.

Nature 176: 22. July 2, 1955.

New procedures have been devised for the hybridization of yeasts. Homothallic and heterothallic, as well as haploid and diploid species may be hybridized. This paper deals with (1) the alpha-glucosidase systems of hybrids arising from species which ferment lactose or maltose, (2) the ploidy of hybrids arising from a haploid and a diploid parent, and (3) the inheritance of sexual differentiation in a cross of a homothallic and a heterothallic species.

PREPARATION OF METHYL GLYCOSIDES OF HOMOLOGOUS α -1,6'-LINKED GLUCO-OLIGOSACCHARIDES AND THE OPTICAL ROTATION OF THEIR CUPRAMMONIUM COMPLEXES.

T. A. Scott, Jr., and F. R. Senti.

Jour. Amer. Chem. Soc. 77(14): 3816-3821. July 20, 1955.

Cuprammonium complexes of several native dextrans were found to be much more levorotatory than was expected from the optical rotation of methyl glucopyranoside in cuprammonium solution and the structure of these dextrans indicated by periodate oxidation analysis. To determine the optical activity of cuprammonium complexes of α -1,6'-linked anhydroglucopyranoside units, free from effects of branching, the lowest members of the methyl isomaltoside homologous series were prepared by methanolysis of NRRL B-512E dextran. Eleven members, DP 1 through 11, were chromatographically separated on a cellulose column and were characterized by paper chromatograms, periodate oxidation analysis, tests for furanose structure, reducing power, methoxyl content, and optical rotation at 4358 Å in aqueous and cuprammonium solutions. For glycosides of DP greater than unity, the difference between the molecular rotation per anhydroglucose unit in cuprammonium and aqueous solutions was proportional to (DP-1)/DP. From this relationship a value of $-99,000^\circ$ was determined for the molecular rotational shift of an α -1,6'-linked unit in a dextran molecule. It was concluded that the presence of a glucosyl unit on number 6 hydroxyl leads to a marked preference for complex formation at the 2,3 position compared with the 3,4 position.

PREPARATION OF STARCH FROM *AMARANTHUS CRUENTUS* SEED.

M. M. MacMasters, P. D. Baird, M. M. Holzapfel, and C. E. Rist.

Econ. Bot. 9(3): 300-302. July-September 1955.

A method for the preparation of starch from seeds of *Amaranthus cruentus* (purple amaranth) was developed to meet the request of medical workers for starch granules of 1 to 3 μ diameter for use in studies of phagocytosis.

An essentially clean preparation of *A. cruentus* starch was obtained. The starch was separated from other seed constituents by centrifuging, sedimentation, and treatments with potassium hydroxide solution at pH 10.5 to 11.0, after the seed had been ground. Tendency to clump on resuspension was overcome by drying the starch out of ethanol and working the sample on a flat surface to break up lumps as the starch dried. The starch is of the waxy or glutinous type and consists of spherical granules ranging from 1 to 3 μ in diameter. Other workers have found *A. cruentus* starch to be useful particle for the study of phagocytosis.

CONTROLLED ENZYMATIC SYNTHESIS OF DEXTRAN: CONDITIONS FOR PRODUCING CLINICALLY SUITABLE MOLECULAR WEIGHT.

N. N. Hellman, H. M. Tsuchiya, S. P. Rogovin, B. L. Lamberts, Robert Tobin, C. A. Glass, C. S. Stringer, R. W. Jackson, and F. R. Senti.

Indus. and Eng. Chem. 47(8): 1593-1598. August 1955.

Previous work at this laboratory has shown that the molecular weight distribution of enzymatically synthesized dextran is influenced by the concentrations of primer, sucrose, and enzyme employed, and the temperature at which the reaction is conducted. This paper will discuss the following factors as they influence the yield of dextran having clinically useful molecular weight (75,000 \pm 25,000): (1) The molecular weight and type of dextran primer, (2) the relation of molecular weight to the concentration of dextran primer, (3) the sucrose concentration, (4) the enzyme concentration, and (5) the reaction temperature.

In a commercial process for enzymatically producing clinical dextran it was desirable to obtain primer dextran as a byproduct of the fractionation. Isolation of the fraction whose molecular weight was too low for clinical use yielded insufficient primer for a recycling process. Additional primer, therefore, was obtained by using the fraction whose molecular weight was too high for clinical use. This fraction was acid hydrolyzed to approximately 25,000 molecular weight and composited without fractionation with the low molecular weight dextran fraction. A yield of dextran equivalent to more than 25 percent conversion of sucrose was obtained in a fraction which met military specifications for molecular weight of clinically suitable dextran from a reaction conducted with such a composite primer.

VISCOSITY, SEDIMENTATION, AND LIGHT-SCATTERING PROPERTIES OF FRACTIONS OF AN ACID-HYDROLYZED DEXTRAN.

F. R. Senti, N. N. Hellman, N. H. Ludwig, G. E. Babcock, R. Tobin, C. A. Glass, and B. L. Lamberts.

Jour. Polymer Sci. 17(86): 527-546. August 1955.

Dextran produced by *Leuconostoc mesenteroides* NRRL B-512 was acid-hydrolyzed and fractionated, yielding a series of fractions from which 24 were selected that ranged in molecular weight from 17,700 to 9.5 million. Light-scattering and viscosity measurements were made on all fractions, and selected fractions were characterized by end-group determinations and velocity ultracentrifuge measurements. Assuming Lansing-Kraemer molecular-weight distributions for the dextran fractions and using sedimentation data to furnish the β , the measure of breadth of the distributions, physical characterizations were corrected for polydispersity. For molecular weights below 100,000, $[\eta] = 1.0 \times 10^{-3} M_v^{0.50}$. In the range 18,000 $< M < 400,000$, $S_{20}^0 = 0.0251 M_0^{0.44}$. The constant Φ' of the Flory-Fox theory, corrected for polydispersity of the fractions, was found to be 53.7×10^{21} which is larger than the value reported for linear polymers. It is concluded that the ratio of root-mean-square radius and hydrodynamic radius effective in viscosity differs for branched and linear molecules. Increase in Φ' for dextran above the value previously assumed necessitates recalculation of data of Wales, Marshall, and Weissberg for g , the ratio of mean-square radii of branched and unbranched dextran molecules.

SOLUBILITY OF MONOGLYCERIDES IN OIL AND ITS RELATION TO THE PRODUCTION OF GLOBAL EDIBLE SPREAD.

N. N. Hellman, H. F. Zobel, and F. R. Senti.

Jour. Amer. Oil Chem. Soc. 32(9): 489-492. September 1955.

Solubility in cottonseed oil was determined between 30° and 70° C. for monoglycerides prepared from palmitic, stearic, and triple-pressed stearic acids, and hydrogenated lard. From less than 0.1% at 30° C., solubility increased three- to fourfold for each successive 10-degree temperature increment between 30° and 70° C. Preparations containing 10% monoglyceride clarified at approximately 70° C. for monostearin, and 65° C. for other systems. For systems cooled at moderate rate (30° C. per hour), spontaneous crystallization occurred at concentrations 5 to 10 times greater than equilibrium saturation.

Manufacture of an edible spread containing monoglyceride and oil requires two heating and cooling cycles: (1) crystallization by rapid chilling from 70° to 15° C. and (2) tempering at 45° C. to improve "mouth feel" and stabilize spread consistency. The nature of the solid produced by rapid crystallization and that produced by subsequent tempering of the monoglyceride will be discussed from the standpoint of its solubility characteristics.

STRUCTURAL FEATURES OF HERQUEINONE, A RED PIGMENT FROM *PENICILLIUM HERQUEI*.

Robert E. Harman, James Cason, Frank H. Stodola, and A. Lester Adkins.

Jour. Organic Chem. 20(9): 1260-1269. September 1955.

The red pigment from *P. herquei*, termed herqueinone in the present work, has been investigated, and several structural features have been established or indicated.

- (1) A highly hindered or phenolic hydroxyl is present.
- (2) Methoxyl, observed by analysis in earlier work, is probably present in an aromatic ring.
- (3) There is present a carbonyl structure which absorbs beyond 6 μ in the infrared.
- (4) Hydrogenation in ether, with platinum catalyst, gives absorption of one mole of hydrogen with generation of a structure containing terminal methyl and an acidic group of acid strength comparable with that of salicylic acid.
- (5) There is probably present a cyclic ether of a highly acidic enol.
- (6) Although there is considerable evidence suggesting presence of a 2-hydroxy-1,4-naphthoquinone structure, no definitive proof of such a structure has been secured.
- (7) Acid cleavage yields methyl isopropyl ketone. This probably arises from cleavage of a cyclic acetal of 2-methyl-2,3-butanediol.
- (8) Alkaline cleavage generates less than a mole of volatile acid and yields a mixture of volatile carbonyl components consisting in part, at least, of aldehyde(s). Methyl isopropyl ketone is absent.

EXPERIMENTAL WET MILLING OF GRAIN SORGUM GRITS.

Roy A. Anderson.

Transactions (American Association of Cereal Chemists) 13(3): 241-248. October 1955.

Laboratory and pilot-plant studies on the recovery of starch and byproducts from grain sorghum grits showed that this raw material could be processed satisfactorily by methods similar to, but simpler than, those used to wet-mill whole grain sorghum or corn. Optimum conditions were established whereby starch of improved quality was recovered in excellent yields. The protein content of the fiber and gluten fractions was sufficiently high, so that they make excellent components for livestock feeds.

PLANT-SCALE EVALUATION OF THE NORTHERN UTILIZATION RESEARCH BRANCH FUNGAL AMYLASE PROCESS FOR GRAIN ALCOHOL.

Austin M. Hanson, T. A. Bailey, Ronald C. Malzahn, and Julian Corman.

Jour. Agr. and Food Chem. 3(10): 866-872. October 1955.

Plant-scale evaluation of the submerged fungal amylase process for grain alcohol fermentation shows that it is both practical and economically feasible. The yield of alcohol from mashes converted with fungal amylase was equal to that from mashes converted with malt. The yield of distillers solubles was increased slightly by the use of fungal amylase as converting agent. Corn containing up to 50 percent damaged kernels could be used efficiently for production of both fungal amylase and alcohol. Detailed operating conditions and procedures are described for the use of fungal amylase in an industrial plant. Also, cost estimates are given for producing alcohol by the fungal amylase process and by the use of malt.

METHYL-D-GLUCOSIDE TETRA-(CHLOROCARBANILATES).

I. A. Wolff and R. L. Mellies.

Jour. Amer. Chem. Soc. 77(20): 5449-5450. October 20, 1955.

Completely substituted *ortho* and *meta* chlorocarbaniates of α - and β -methyl glucosides were prepared, and their solubilities, melting points, and optical rotations determined. As in the case of similar derivatives of corn starch, the properties of the *ortho* derivatives appeared to be affected by a tendency of the materials to exist in at least partially chelated form.

A NEW SYNTHESIS OF 2, 4-DI-Q-METHYL-D-GLUCOSE.

J. W. Van Cleve and W. C. Schaefer.

Jour. Amer. Chem. Soc. 77(20): 5341-5343. October 20, 1955.

Partial methylation of phenyl 6-Q-trityl- β -D-glucopyranoside followed by detritylation gave phenyl 2,4-di-Q-methyl- β -D-glucoside in 15% yield. Hydrolysis of glycoside gave crystalline 2,4-di-Q-methyl-D-glucose identified through conversion to the known β -methyl glycoside. For characterizing small amounts of the reducing sugar the N-p-nitrophenyl- and N-p-bromophenyl-2,4-di-Q-methyl-D-glucosylamines are advantageous derivatives

THE ANALYSIS OF LIPIDS BY COUNTERCURRENT DISTRIBUTION.

Herbert J. Dutton.

Jour. Amer. Oil Chem. Soc. 32(11): 652-659. November 1955.

Since the first paper appeared in 1948, more than 30 communications have been published which demonstrate the potentialities of the countercurrent distribution technique for the study of a variety of problems of lipid chemistry. Applications include analytical and preparatory operations, involving glycerides, fat acids, esters of fat acids, phospholipids, bile acids, fat-soluble pigments, and oxidative products from fat acids. A review of theory, apparatus, and typical results is presented.

FLAVOR EVALUATION OF FATS AND OILS.

C. D. Evans.

Jour. Amer. Oil Chem. Soc. 32(11): 596-604. November 1955.

The principles of organoleptic evaluation are explained and discussed on the basis of work conducted with an analytical taste panel at the Northern Utilization Research Branch. Types of sensory panels, methodology of tasting, panel selection, taster motivation and performance, and the interpretation of results are presented and interpreted with the object of showing what results are possible and what variation may be expected with small analytical-type taste panels. The application of taste panel methods to various problems are discussed and the importance of these results to research and industrial development are presented.

HETEROGENEITY IN DEXTRAN PREPARATIONS.

C. A. Wilham, B. H. Alexander, and Allene Jeanes.

Arch. Biochem. and Biophys. 59(1): 61-75. November 1955.

The properties and characteristics of dextrans from more than 96 different strains of bacteria were so diverse that additional information on their suspected molecular heterogeneity was essential for characterization and utilization. The application of two fractional precipitation methods to five typical high molecular weight dextrans

showed that, in addition to molecular size, the kind and proportion of each type of anhydroglucopyranose linkages can influence the heterogeneity in dextrans. These observations permitted tentative interpretation of the extent and nature of the heterogeneity in dextran preparations from many different bacterial strains.

INHERITANCE AND HERITABILITY OF PROTEIN, NIACIN AND RIBOFLAVIN IN OATS.

K. J. Frey, H. H. Hall, and M. C. Shekleton.

Jour. Agr. and Food Chem. 3(11): 946-948. November 1955.

In three segregating populations of oats it was found that the genes determining high protein percentage could either be recessive or dominant depending upon the genetic background on which they operated. With one parent the high protein percentage behaved as a dominant in one cross and recessive in the other, while for another parent, low protein percentage behaved as the dominant in one cross but recessive in another. High niacin and riboflavin content in oats appeared to be dominant in each of the oat crosses. Heritability percentages for niacin and protein content ranged from 83 to 93, while those for riboflavin ranged from 0 to 52.

MAINTENANCE OF CULTURES OF INDUSTRIALLY IMPORTANT MICROORGANISMS.

W. C. Haynes, L. J. Wickerham, and C. W. Hesseltine.

Appl. Microbiol. 3(6): 361-368. November 1955.

The NU Culture Collection is organized in three parts, a person with specialized training in charge of each. The basic principles which guide those responsible are:

1. The person in charge of a given category of microorganisms must be well enough acquainted with the component taxa that he will usually know the media and conditions best suited to permit typical growth of any strain.
2. The methods of preservation must be chosen from a knowledge of the advantages and disadvantages of the various methods and from a comprehension of the characteristics and requirements of the microorganisms to be preserved.
3. The salient hazards of maintaining a collection must be known and guarded against.
4. One thousand cultures per person is about the proper assignment in maintaining a collection adequately if primary dependence for preservation is placed in the lyophil method.

A DYE-DILUTION METHOD FOR ESTIMATING SOLIDS CONTENT OF PLASTIC FATS.

H. F. Zobel, N. N. Hellman, and F. R. Senti.

Jour. Amer. Oil Chem. Soc. 32(12): 706-709. December 1955.

The solids content of a plastic fat can be estimated by adding a weighed quantity of oil-soluble dye to a known weight of fat, separating in the ultracentrifuge a portion of the dye-oil phase, and determining with a spectrophotometer the concentration of the dye in the separated oil. Since the dye must be distributed throughout the oil phase, this yields the amount of oil in the spread and the solids represent the difference between the amount of spread taken and the amount of oil determined. Of 37 dyes tested, Eastman Blue BN (a mixture of 1-hydroxy-4-methyl aminoanthraquinone and 1,4-bis-methyl aminoanthraquinone) appeared most suitable for use in this analytical method. This technique has been applied to the estimation of solids in global edible spread, butter, margarine, lard, and shortening. The measure of true solids obtained by this technique, coupled with the concurrently measured solids residue obtained from ultracentrifugation, should be valuable in the study of consistency changes arising from diverse industrial processing conditions.

RAPID ESTIMATION OF DIALDEHYDE CONTENT OF PERIODATE OXYSTARCH THROUGH QUANTITATIVE ALKALI CONSUMPTION.

B. T. Hofreiter, B. H. Alexander, and I. A. Wolff.
Analyt. Chem. 27(12): 1930-1931. December 1955.

Reaction conditions are given under which one equivalent of base is consumed by each oxidized unit in periodate oxystarch. These form the basis of a rapid, reproducible, and easily carried out analytical method for determination of the extent of oxidation of starch by periodate.

INTERPRETATION OF PERIODATE OXIDATION DATA ON DEGRADED DEXTRAN.

R. J. Dimler, I. A. Wolff, J. W. Sloan, and C. E. Rist.
Jour. Amer. Chem. Soc. 77(24): 6568-6573. December 20, 1955.

The amount of formic acid produced from reducing end-group units of dextrans on oxidation by periodate is different from the amount produced from the other units, and also varies with the position through which the reducing end group is linked to the remainder of the chain. Consideration of this fact together with the possible structures of dextran and several assumed modes of hydrolytic cleavage, has enabled a more complete interpretation of periodate oxidation analyses of partially degraded dextrans. There appears to be an increase in the proportion of 1,6'-linkages in partially hydrolyzed dextran due to the greater ease of hydrolysis of other linkage types present. Periodate oxidation data on dextran derived from *Leuconostoc mesenteroides* NRRL B-512 are consistent with the simplified modes of degradation depicted while those from the NRRL B-1254 and B-742 dextrans are not.

*THE AMADORI REARRANGEMENT.

John E. Hodge.

Pages 169-205 of book entitled "Advances in Carbohydrate Chemistry,"
Vol. X, Academic Press, New York. 1955.

The isomerization of sugar-amine condensation products and the concomitant enolization and decomposition reactions are reviewed and correlated. The importance of these reactions for organic syntheses, biochemical transformations, and the non-enzymic browning of foods is indicated. Contents include nomenclature, scope and mechanism of the reaction, experimental methods, physical and chemical properties, and proof of structure of Amadori rearrangement products. Known 1-amino-1-deoxy-2-ketoses and their derivatives are tabulated with the corresponding physical constants and literature references.

SYMPOSIUM ON THE MAINTENANCE OF CULTURES OF MICROORGANISMS.

D. Perlman, S. E. Hartsell, R. H. Haskins, A. C. Blackwood, W. C. Haynes, L. J. Wickerham, C. W. Hesseltine, Robert J. Heckly, Melvin N. Klumpp, S. H. Hutner, Luigi Provasoli, and Helen R. Skaggs.

Bacteriological Reviews 19(4): 280-283. December 1955.

Abstracts of seven papers presented in a symposium on the maintenance of cultures of microorganisms are combined in this article. In essence it is a discussion of a number of methods which have been used in recent years for preserving microorganisms and the results of the application of these methods to the maintenance of cultures of interest in agricultural, industrial and medical microbiology.

CONTRACT RESEARCH PUBLICATIONS

THE MARKET POTENTIAL FOR FATS AND OILS IN DRYING-OIL USES.

Battelle Memorial Institute, Columbus, Ohio. (Report of work done under contract with the U. S. Department of Agriculture and supervised by the Market Development Branch of the Agricultural Marketing Service and the Northern Utilization Research Branch of the Agricultural Research Service.)

U. S. Dept. Agri. Agr. Mkt. Serv. Marketing Research Report No. 90, 126 pp. (Processed.) April 1955.

STREAMING BIREFRINGENCE BEHAVIOR OF DEXTRANS PRODUCED BY *LEUCONOSTOC MESENTEROIDES*.

Jen Tsi Yang and Joseph F. Foster, Iowa State College, Ames, Iowa. (Report of research work done under contract with the U. S. Department of Agriculture and supervised by the Northern Utilization Research Branch of the Agricultural Research Service.)

Jour. Polymer Sci. 18(87): 1-15. September 1955.

ADD TO ARS 71-3, SUPPLEMENT 2 **

LIST OF PUBLICATIONS AND PATENTS, OILSEEDS AND RELATED SUBJECTS. 1954.

U. S. Dept. Agri. ARS-71-5, 3 pp. (Processed.) March 1955.

A list of papers published and patents granted during 1954 on oilseeds and related subjects.

PATENTS

These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U.S. Patent Office, Washington, D. C.

ELECTROCHEMICAL PRODUCTION OF PERIODATE OXYPOLYSACCHARIDES.

Charles L. Mehlretter.

U. S. Patent 2,713,553. July 19, 1955.

Polysaccharides, such as starch or cellulose, are oxidized with periodic acid in the presence of a means for electrically regenerating the periodic acid as soon as it becomes reduced. The oxidation is carried out in a compartmented cell, the cathode being surrounded by an alkaline catholyte to increase efficiency of the oxidation.

**Notice of publication received too late for previous listing.

METHOD FOR CONDUCTING THE AMADORI REARRANGEMENT OF N-GLYCOSIDES.

John E. Hodge.

U. S. Patent 2,715,123. August 9, 1955.

Amine derivatives of glucose are caused to rearrange to amino fructose derivatives via the Amadori rearrangement using novel non-acid reagents that expand greatly the applications of this rearrangement and result in a new class of compounds.

SOLVENT EXTRACTION OF OPIUM ALKALOIDS.

Charles L. Mehlretter and Francis B. Weakley.

U. S. Patent 2,715,627. August 16, 1955.

Poppy straw, i.e., dried poppy stems and capsules, are extracted with an aqueous solution of an alcohol such as water-extracted butanol. The extract may be treated in known manner to recover a crude alkaloid product rich in alkaloids, principally morphine and codeine. The weight ratio of water to alcohol is 1-2 parts for each 10 parts of alcohol.

CONDENSATION PRODUCTS OF α -AMINO ACIDS AND PHENOLS.

Leonard L. McKinney, Eugene A. Setzkorn, and Eugene H. Uhing.

U. S. Patent 2,717,263. September 6, 1955.

Phenolic compounds such as phenol, cresol, resorcinol or A-stage phenolic resins are condensed with formaldehyde-modified α -amino acids to produce monomeric or low molecular weight polymeric products useful as wetting, emulsifying, or protein-dispersing agents.

OLEAGINOUS SPREAD.

Edwin P. Jones, Herbert J. Dutton, and John C. Cowan.

U. S. Patent 2,718,468. September 20, 1955.

An oleaginous composition suitable for spreading on bread is prepared by dissolving 10-20 parts of a mono- or di- ester (fat acid) of glycerol in 80-90 parts of an edible glyceride oil, such as soybean oil. Graininess is avoided by rapid chilling, and the texture is improved by the addition of a minor amount of a polyoxyalkylene ester of a fat acid. The composition has a spreadable plasticity at temperatures as low as 0° F.

THERMAL MODIFICATION OF DEXTRAN.

Ivan A. Wolff, Paul R. Watson, and Carl E. Rist.

U. S. Patent 2,719,147. September 27, 1955.

Dextran is depolymerized by controlled heat treatment, the products possession predetermined viscosity characteristics in aqueous solution.

CONTROLLED ENZYMATIC SYNTHESIS OF DEXTRAN.

N. N. Hellman, Henry M. Tsuchiya, S. Peter Rogovin, Richard W. Jackson, Frederic R. Senti.

U. S. Patent 2,726,985. December 13, 1955.

Dextran of intermediate molecular weight is produced directly by synthesis from sucrose, using dextransucrase in the presence of a "primer" substance, i.e., a dextran of lower molecular weight. The process is rendered cyclic by reuse of "head" and "tail" fractions, recovered from the process.

PURIFICATION OF PHOSPHATIDES.

Charles R. Scholfield and Herbert J. Dutton.

U. S. Patent 2,727,046. December 13, 1955.

Phosphatides, containing carbohydrate impurities, are purified by extraction with an aqueous solution of one of the lower alcohols. The purified phosphatides may be used in foods.

MODIFICATION OF DEXTRAN SYNTHESIS BY MEANS OF ALTERNATE GLYCOSYL ACCEPTORS.

Harold J. Koepsell, Nison N. Hellman, and Henry M. Tsuchiya.

U. S. Patent 2,726,190. December 6, 1955.

The dextran synthesis, based on enzyme action, is modified by sugars or sugar-like compounds (maltose, isomaltose, alpha-methyl glucoside and glucose) which accept glucosyl groups in competition with normal dextran synthesis. Several acceptors can initiate chain-formation, and their presence in substantial amounts results in the synthesis of polysaccharide products competing with normal dextran synthesis. Other acceptors appear capable of accepting a limited number of glycosyl groups before their molecules become substantially deactivated. In the former case, the synthesis may be carried out so as to control very closely the molecular weight and degree of polymerization of the competitive polysaccharides.

SYNTHESIS OF DEXTRAN AND DEXTRAN ANALOGUES OF PREDETERMINED MOLECULAR WEIGHT.

Henry M. Tsuchiya, Nison N. Hellman, and Harold J. Koepsell.

U. S. Patent 2,724,679. November 22, 1955.

Dextran of intermediate molecular weight (50,000 to one million) is produced directly by synthesis from sucrose and dextran sucrose enzyme in the presence of a "primary" substance, i.e., a dextran with a molecular weight from 5,000 to 30,000. The weight ratio of primary substance to sucrose is within the range of 1:5 to 1:100 and the concentration of dextran is 20 to 400 units per milliliter of reaction mixture.

PREPARATION AND RECOVERY OF α -KETOGLUTARIC ACID.

Harold J. Koepsell, Frank H. Stodola, and Eugene S. Sharpe.

U. S. Patent 2,724,680. November 22, 1955.

Pseudomonas bacteria are cultured on glucose substances containing limited amounts of assimilable nitrogen. The media employed are synthetic, containing no degraded proteinaceous substances. The product recovered by treating the solid residue from the fermentation with mineral acid and then extracting the treated substance with a water-immiscible organic solvent.

PRODUCTION OF FRUCTOSE.

Harold J. Koepsell, Richard W. Jackson, and Clarence A. Hoffman.

U. S. Patent 2,729,587. January 3, 1956.

Sucrose is subjected to the action of dextransucrase whereby the molecule is split into its components, dextrose and fructose. The dextrose is utilized by dextransucrase in the synthesis of dextran; the fructose remaining as such in the synthesis medium. It is recovered in a pure form and in substantial quantities by applying known methods of separation.

POLYMERIZATION PROCESS USING BORON FLUORIDE.

C. Bradford Croston, Howard M. Teeter, and John C. Cowan.

U. S. Patent 2,729,658. January 3, 1956.

Long chain fatty acids or mixtures are polymerized by heating with boron tri - fluoride.

AGRICULTURAL RESIDUE ABRASIVES.

Thomas F. Clark.

U. S. Patent 2,733,138. January 31, 1956.

Ground nut shells, rice hulls and other agricultural residue grits are incorporated as the principal ingredient in resin-bonded grinding and finishing wheels for working the softer metals.

CONTROLLED ENZYMOLYSIS OF HIGH-AMYLOPECTIN STARCH.

Rolland L. Lohmar, Jr., Francis B. Weakley, and George E. Lauterbach.

U. S. Patent 2,738,305. March 13, 1956.

A starch consisting essentially of amylopectin is hydrolyzed with α -amylase. Dextrins of predetermined properties are obtained by following the hydrolysis viscometrically. The invention makes possible the reproducibility of dextrins having desired properties.

